Unusual presentation of more common disease/injury

A “not so superficial” skin infection in a patient with diabetes

James Michael Carr, Guy Hagan, Peter Guest, Simon Gompertz

Respiratory Department, University Hospitals Birmingham NHS Trust, Birmingham, UK

Correspondence to Dr James Michael Carr, james.carr@nhs.net

Summary

A woman in her 60s with type 2 diabetes presented with a 4-week history of a rash on her chest wall, flu-like symptoms and a red right eye. On examination, there was a cellulitic rash over the right chest wall, breast and neck and a hypopyon in the right eye. Chest x-ray demonstrated right upper lobe opacification, with subsequent CT and MRI revealing bilateral collections at the lung apices, and a possible permeative bone destruction of the manubrium, respectively. A diagnosis of primary sternal osteomyelitis with associated lung abscesses, chest wall cellulitis and hypopyon due to endogenous endophthalmitis was made, with microbiological assessment identifying group B β -haemolytic streptococci. The patient underwent surgical debridement of the affected tissue and received 6 weeks of intravenous antibiotics. This case highlights the role of multidisciplinary team involvement in management of infections and the need to consider deep-seated infection in diabetics.

BACKGROUND

This is an unusual presentation of a soft tissue infection with a group B β -haemolytic streptococcus, resulting in extensive soft tissue involvement. It highlights how multidisciplinary team involvement (respiratory medicine, thoracic and plastic surgery, radiology, ophthalmology and microbiology) can have a role in management of infections, as well as the importance of regular reassessment for consideration of possible alternative differential diagnoses.

CASE PRESENTATION

A Chinese housewife in her early 60s, initially from Hong Kong but resident in the UK for 30 years, presented to the A&E department with a 4-week history of a cellulitic rash on her anterior chest wall, accompanied by ‘flu-like’ symptoms, and a cough productive of green sputum 3 weeks later. She denied any history of previous trauma to the skin of the chest wall, although she had undergone an acupuncture session 3 weeks back; the needles had been inserted over both trapezius muscles, and the clavicular and supraclavicular regions bilaterally. In addition, the patient complained of a red, itchy right eye with decreased vision. Her medical history was of essential hypertension and type 2 diabetes mellitus, poorly controlled with a combination of metformin and basal-bolus insulin.

On presentation, there was an extensive, indurated and erythematous cellulitic rash present over the right anterolateral chest wall, breast and neck, with two small, initially dry, scabbed lesions over the lateral aspect of the breast. A hypopyon was noted in the right eye. Her observations were as follows: temperature, 38°C; blood pressure, 141/65; oxygen saturations, 95% on air; BM stix, 5.2.

INVESTIGATIONS

Initial investigations were as follows: haemoglobin 8.9 g/dl; white cell count $16.7 \times 10^9/l$; C reactive protein 259 mg/l; urea of 14.4 mmol/l. Initial chest x-ray is shown in figure 1. CT thorax 24 h later showed that the

opacification seen on the chest x-ray in the right upper lobe was at least partly a fluid collection. Additional CT features were consistent with an abscess of the superior right chest wall (some very small gas bubbles were noted) with overlying cellulitis, along with a possible permeative bone destruction of the manubrium (figure 2).

Repeat CT thorax (day 6) showed radiological progression despite broad spectrum antibiotics (figure 3). A CT-guided biopsy of the right upper chest wall collection (day 8) revealed necrotic tissue. Limited repeat imaging at this time showed more extensive locules of gas in the right chest wall and right upper lobe. Cocco-bacilli, and a group B β -haemolytic streptococcus were isolated on enrichment broth. No fungal hyphae or acid fast bacilli were seen and DNA for actinomycetes was not detected

Figure 1 Admission chest x-ray showing a large opacity in the right paramediastinal region and upper zone.

Figure 2 CT thorax from the day after admission. This identified superior right chest wall cellulitis, a right upper lobe ‘mass’ with associated collapse and consolidation and a possible permeative bone destruction of the manubrium.

by 16S rDNA PCR. There were no valvular vegetations seen on a transthoracic echo.

CD4T cell numbers were normal, and there were polyclonally increased immunoglobulins. HIV antigen and antibodies tests were negative. These results made the possible diagnosis of immunodeficiency less likely.

Following the development of clinically detectable surgical emphysema on the right chest wall, another CT thorax was requested (day 14). This revealed that the right lung apical abscess was in continuity with fluid and gas along the right anterior chest wall, with sufficient subcutaneous gas noted to raise concerns of necrotising fasciitis (figure 4). The posterior surface of the manubrium was still noted to be irregular and an MRI of the sternum confirmed the presence of osteomyelitis.

Bronchoscopy was macroscopically normal, with no fungal hyphae, Gram-positive bacteria, acid-fast bacilli or malignant cells in the washings. Histology of the chest wall samples obtained following surgical debridement of

necrotic tissue showed necrotising septal panniculitis with multicentric furunculosis.

DIFFERENTIAL DIAGNOSIS

The initial differential diagnosis was of chest wall cellulitis, perhaps related to the patient’s previous acupuncture,¹ with less likely alternatives felt to be tuberculosis (TB) and lung cancer. The patient was started on antibiotics for her cellulitis; however, an initial CT thorax demonstrated that the inflammatory process was more extensive than initially suspected, with an underlying abscess and the possibility of sternal osteomyelitis. The right upper lobe mass was seen to be associated with local lung collapse and consolidation, suggestive of an infective process, but malignancy could not be excluded.

After several days of intravenous antibiotics, the patient’s white cell counts and inflammatory markers were improving, but the cellullitic rash became more extensive with new, erythematous, ulcerated lesions

Figure 3 CT thorax taken on day 6. This identified new fluid collections at the left lung apex and right sternoclavicular joint. The pectoral muscles of the right chest wall appear thickened.

Figure 4 CT thorax from day 14. This image highlights the extensive subcutaneous gas in the soft tissue of the right chest wall that raised concerns of necrotising fasciitis.

Figure 5 Clinical photograph demonstrating appearance of right chest wall and breast following spread of erythema and development of new, wet, ulcerated lesions.

(figure 5). This, in combination with the presence of the hypopyon in the right eye, raised concerns of a disseminated infection. Vitreous sampling had demonstrated an endogenous endophthalmitis, a rare but serious condition that can result from bacteraemia and occurs when bacteria cross the blood-ocular barrier and multiply within the eye.² The possibility of septic emboli was considered because of the involvement of multiple sites (chest wall, right eye and possibly sternum). A transthoracic echocardiogram was performed (although there were no stigmata of bacterial endocarditis), and this was unremarkable. The cardiology team did not feel that a transoesophageal echo was needed in the absence of a murmur, with normal transthoracic studies and no stigmata of valvular endocarditis.

At this stage, culture of chest wall swabs had only identified mixed skin flora, and blood cultures had been negative. Sputum samples and three early morning urine samples were smear negative for TB. A repeat CT thorax was performed given the worsening clinical appearance of the chest wall; this confirmed more extensive subcutaneous collections, a left apical lung collection and that the right lung mass showed characteristics in keeping with an abscess. Following specialist radiological review of the CT images, osteomyelitis was felt to be unlikely (although later proven by MRI). The appearance of the lung mass raised the question of an actinomycete infection.

Biopsy of material from the chest wall was performed to try and establish the causative organism. There was no evidence of mycobacterial, fungal or actinomycete infection. A group B β -haemolytic streptococcus that was isolated was felt to be the pathogen. Histology from material obtained at surgical debridement showed a septal panniculitis with furunculosis.

The final diagnosis was thought to be primary sternal osteomyelitis with associated lung abscesses, cutaneous extension and endogenous endophthalmitis.

TREATMENT

Initial treatment of the cellulitis was with high-dose intravenous flucloxacillin as per our antibiotic protocol. Owing to extension of soft tissue involvement, vancomycin was added to cover for the possibility of a methicillin-resistant staphylococcus aureus (MRSA) infection. Subsequently, the patient's antibiotics were switched to

linezolid following advice from microbiology colleagues to cover for a potential Panton-Valentine leukocidin toxin producing *Staphylococcus aureus*. Once the group B β -haemolytic streptococcus had been isolated, and with the worsening clinical picture, rifampicin and meropenem were added. Treatment of the patient's endogenous endophthalmitis was with intravitreal injection of antibiotics followed by oral ciprofloxacin and topical cyclopentolate, ofloxacin and dexamethasone.

Surgical intervention by the thoracic and plastics team involved debridement of the affected skin and necrotic subcutaneous tissue. The right second rib was resected to facilitate open drainage of the empyema cavity. A vacuum dressing was applied to the anterior chest wall wound, which was also subsequently irrigated at regular intervals. Further debridements were required, and a split skin graft was applied 28 days following the initial surgery, with intravenous antibiotics continuing for 6 weeks in total.

OUTCOME AND FOLLOW-UP

The patient recovered well from her surgical intervention and skin grafting, with follow-up assessment at 2 months identifying a well-healing graft, with no evidence of fistula formation. An outpatient follow-up CT scan of the thorax is awaited. Unfortunately, she continues to suffer with poor visual acuity in the right eye and is continuing to be seen on an outpatient basis by the ophthalmology team.

DISCUSSION

Although cellulitis and osteomyelitis are most commonly caused by group A β -haemolytic streptococci (*Streptococcus pyogenes*) and *S aureus*,³ group B β -haemolytic streptococci have been described as causing skin and soft tissue infections in adults,^{4 5} although these bacteria are most commonly associated with infections of neonates. Risk factors for infection include several chronic diseases, such as liver cirrhosis, stroke and cancer,⁶ with diabetics having a 10.5 times increased risk.⁴ The incidence of group B streptococcal infections in adults is on the increase, particularly in individuals with other underlying medical conditions⁷ and the elderly.⁸ Infection causes a variety of pathologies including bacteraemia without an identified source, soft tissue infections, pneumonia and urosepsis.^{7 8}

There are no national guidelines on the treatment of soft-tissue infections, but it is common practice to treat these with benzylpenicillin, if the infection is known to be caused by *S pyogenes*, or with flucloxacillin to cover for both *S aureus* and *S pyogenes*. However, clinicians should be guided by local antimicrobial policies, and by the sensitivities of cultured organisms. For bone infections, treatment must usually be prolonged over 4–6 weeks. There is some evidence that treatment of group B streptococcal infections requires higher doses of antibiotics than those caused by group A streptococci.⁸

Development of endogenous bacterial endophthalmitis occurs when bacteria cross the blood-ocular barrier and multiply within the eye. The commonest causative organisms in North America and Europe are Gram-positive bacteria including *S aureus*, group B streptococci, *Streptococcus pneumoniae* and *Listeria monocytogenes*.² Diagnosis is often missed, and outcomes are poor with blindness often resulting.

Cellulitis following acupuncture has previously been reported in the literature, although in one study, only a single case of cellulitis out of nearly 32 000 acupuncture sessions was reported,¹ suggesting that acupuncture is a very safe treatment, at least in terms of risk of postprocedure infection.

Learning points

- ▶ Consider skin signs in solid organ disease.
- ▶ Consider deep-seated infection in diabetics.
- ▶ Be aware of distant complications of infection.
- ▶ Repeat imaging can have an important role in an evolving clinical situation.
- ▶ Reminder that surgical input can have an important role in infection management.

Competing interests None.

Patient consent Obtained.

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